SOME PRESENT NEEDS IN SYSTEMATIC BOTANY.

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If an editor were to survey the families and genera and species of the vegetable kingdom, he would find himself making comparisons and drifting to conclusions respecting the character of the systematic work and the worth of various contributions. Many of these conclusions he might not be able to analyze. They might be very much in the nature of impressions, and yet they might be felt so strongly as to be convictions. It is a vast field that his oversight would cover, and the bases of comparisons would be of the most various kinds, yet the convictions in very many cases would be concrete. It may be well to consider for the moment some of these possible convictions, of course in no spirit of captiousness, but to bring other points of view on some of our common problems, even though these points of view may not always be capable of direct application.

Very likely, his first feeling would be a consciousness of the great variety in the methods of the monographs. The systematic work is rapidly specializing, and the specialists make their own criteria. The result is a marked diversity in the work, which all the efforts at standardization do not very much control. Probably, Bentham and Hooker's "Genera Plantarum" is the last of the comprehensive works to be brought to a completion by a single person or by two or three persons working as one. This is succeeded by the editorial work of Engler and Prantl in "Die Natürlichen Pflanzenfamilien," and later in more detail by Engler in "Das Pflanzenreich." Floras of countries and regions tend more and more to be constructed editorially, with contributions by specialists. All this results perhaps in closer work in the specialties and the details, but it may lack in coordination and in the balancing of the parts.

Probably all the larger conclusions by our hypothetical editor would be derived from this general situation. No longer do we have the controlling authority of one man, holding the work steady and maintaining a homogeneous method. I well remember a remark that Asa Gray made about his Compositæ, on which he had worked so long and so lovingly, seeing the end of his time and foreseeing the change of his method. I remember also that in those days I was somewhat violently interested in nomenclature and I proposed to publish on it; but Gray gently dissuaded me: it was some years before I understood why.

A Situation in Nomenclature.

In proportion as we lose the influence of a single controlling personality, or of a few personalities working in an understood harmony, do we resort to arbitrary and conventional methods of codification. This is well illustrated in the convulsions in nomenclature in recent years. In this country, for example, with the passing of Gray, we began to give up the combination of two words as the name of a plant, and to substitute the oldest specific name brought down through any number of genera. Intrinsically, one method is as good as the other, but we sought to arrive at uniformity by rigidly adopting one of them. A train of difficulties has followed this and other innovations, and instead of finding ourselves in full harmony of action, with one uniform practice in nomenclature, we have two or three or several practices, and to a considerable extent each worker making his own. The present situation in nomenclature is a vivid illustration of the failure of arbitrary means of standardization. The situation also has a social significance, as I shall attempt to suggest.

The probability is that we should have arrived at our destination sooner and with no greater confusion if we had allowed the situation to work itself out without formal regulation, recognizing more fully the principle of usage which in the end controls all language. We have probably made a mistake in endeavoring to substitute arbitrary priority for stability; at all events, we might have saved ourselves the very amusing exercise of upsetting a well established name for the purpose of substituting an older name in order that

we might make the name stable. It looks now as if usage were after all to control in the end, and in some regards quite independently of arbitrary regulations. The principle of undeviating priority has not yet controlled for any length of time in the development of language. It is a false premise.

I am not now arguing for a return to any older or prior method, nor in challenge of any current practice, and certainly not in criticism of any group of workers, for we shall probably outgrow our conventionalities sooner by working with them rather than against them. But I must protest, as I have protested many times before, against the assumption that the names of plants belong to botanists to do with them as they will. This is only another way of saying that these latinized names of plants are rightfully a part of language and are not mere formulæ or symbols to be used only by insiders. We desire that the public shall use this language. We publish our manuals with this purpose. We try to make plant books simple, that they may be popular. We take pains to spread the knowledge of plants and thereby to promote the love of nature. There are thousands of persons who sell plants, and the names become established in trade and represent commercial values. These values cannot be shifted readily from name to name; and if one makes a plea for correct nomenclature in plantsmen's catalogues and lists, one receives the reply that it is scarcely worth the while seeing that the names change so frequently. The custom of shifting the names is undoubtedly directly responsible for much of the disregard of new nomenclature on the part of dealers; and we must remember that the use of these kinds of names among the people is probably promoted more by the plant dealers than by the botanists. I judge that the botanists have not yet succeeded in securing the active and free cooperation of this great class of people.

Of course we are to recognize that much of the change is inevitable, that, in fact, it is a consequence of new and closer studies of the groups, resulting in a clearer understanding of generic and specific limitations. This is a contribution to knowledge which everyone must accept. But there is a class of changes which does not have this justification. I am conscious, in making inquiries,

that the first thought of some particularists appears to be a desire to see whether it is possible to change the names.

Nor am I yet ready to leave this subject. From a successful and sincere public lecturer, who is trying to lead the people to a knowledge of animals and plants, I had a request for aid containing the statement that he could devote only a little time daily "to the study of Latin and I want to get only a sufficient knowledge of it to enable me to know why the gipsy moth is called (*Porthetria dispar* L.) and whether *Raphamus raphanistrum* means a plant, an insect or a tribe of elephants." This person, of course, had not had a college training in these particular subjects, but he is not ignorant or inattentive. He writes that he has about 2,000 bulletins, many bound volumes and a special cyclopedia, nearly all of which material is classified, using a card-index. "It has taken a lot of work to do this but as I can spare from farm labor only about an hour each day for study I find the index is a great time saver by showing me just where to find what I want." This man will accomplish much with his methods of contact. But consider the position of this man if to a complicated system of nomenclature we add a continuous tendency to change; and I think it is fairly our obligation to consider his position.

When we feel within us the desire to change the names of genera and groups, let us think well of this man and his carefully considered hour,—what it would mean to him in cross-referencing, in indexing, in the readjusting of his work. If it is to bring new knowledge that we cannot so well record otherwise or indispensable definitions, very good; but the burden of proof always rests on the new name. The work with names is fascinating, even captivating, and every change identifies the worker with it; but we are not to forget that some of this work is likely to be of the kind that, in other fields, might be called pedantry.

Bear with me further while I call your attention to the fact that we are not only changing our plant names with apparent disregard of the users of them, but that we are also making them more complicated. To the name of the plant,—genus and species,—we add the authority. We now omit the punctuation and thereby make the

author in effect a part of the name. When the combination of two words was held to constitute the name of a plant, the author of the combination was sufficient for identification; but with the single-word system we carry the author of both the original specific name and of the new combination, and the whole becomes something like a complicated formula. This is a convenience to the worker with plant names, but he is not the only party concerned; his needs may be served in the citation of the synonomy. His obligation to the public is to present the simplest possible name and the least involved. If the history is to be retained in the name-compound, where may we not stop and how complicated may our formulæ finally become? We may in time evolve a phraseology, or an algebraic form, as complicated as some of the pre-Linnæan customs. We are really confusing two things,—nomenclature and bibliography. We should separate citation from nomenclature. We have no right to inflict the public with our taxonomic book-keeping.

There are three pressing needs in our present systematic botany, as I see it. One of these needs I have now tried to suggest, which is the urgency to subordinate the nomenclature question. This is specially important in a democracy, where we desire to give all qualified persons equal chance, where we are supposed to remove hindrances and arbitrary domination by central authorities and to allow the people to express themselves freely. The public has real rights in the names of plants. Soon we must stop playing with names.

A Situation as to Species and Genera.

The oversight that we assumed in the beginning would undoubtedly discover other interesting situations in our systematic work. What these comparisons might be would depend, of course, on the particular person who made them; but in respect to the American work, with which at the moment we are mostly concerned, any person could not fail to admire the quality of the monographs and lesser contributions. Although systematic botany may occupy a subordinate place in our teaching, it is receiving extensive and very expert attention both from amateurs and from those attached officially to the great collections, and the published work is such as to

give us much pride. Ability of a high order continues to express itself in this field.

We have noted the tendency to specialize. Persons become expert in certain detached groups of plants. We become most skillful in detecting the differences that may distinguish species, but it may be doubted whether we are equally skillful in bringing together the agreements that may formulate genera. We seem now to be discovering separateness. It does not follow that one who has nice judgment on species necessarily has equal authority on genera. The tendency to break up our old groups into many genera, is apparently the result of the application of the species-habit. It is a great question whether the method of separation is the proper one to apply equally in these two kinds of cases.

Perhaps we cannot hope for much result in the standardizing of the species-conception by our methods of herbarium work, but it ought not to be difficult to arrive at some kind of an agreement on genera. We may well consider the advisability of being progressive in searching out the ultimate specific units—so far as there are such units—at the same time that we hold a conservative attitude on genera, for we can scarcely assume that there are ultimate generic lines. Thereby we might make a truthful presentation of the vegetable kingdom at the same time that we avoid vast changes in nomenclature.

A Situation as to the Living Material.

With the needful specialization of the systematic work, we find ourselves with very unequal treatment in the different groups. This inequality is perhaps the most outstanding characteristic of our present phytographical publication. It is impossible at present to compile a general work with any clear approach to uniformity of handling in the different genera and families. This is due in part to the fact that some of the groups have been recently worked over whereas others still retain a traditional treatment. Nor is it desirable that there shall be rigid codification on genera, for we need the judgment of different workers and this necessarily leads to non-uniformity; the specialist is entitled to his method; and yet the inequalities in interpretation appear to be so great in many cases as to amount to inharmony and even to confusion.

While there is more hope in the standardizing of genera than of species, it is within the possibilities to arrive at some kind of agreement on specific values, but this is not to be expected as a result of codification or regulation: it must be a real agreement by men who are brought together on a new kind of study of a common line of problems.

As I have already indicated, I would not expect or even desire a dead uniformity of treatment in any range of systematic work, and least of all in species. It would be a great misfortune to lose the expression of personality in even such formal work as this. But there is need of a closer understanding as to the essential facts in the treatment of the members of a genus. If one were to look over *Erythrina,* for example, one would find about 50 species recognized, native in warm countries in the two hemispheres; and while there is much uncertainty as to the characters of given species, one would not find very wide disagreement between the different authors. If next one were to look on *Eschscholtzia,* one would find a wholly different state of things, notwithstanding the fact that this genus is confined to western North America. Gray saw about a dozen species in this genus; Greene, with more material to work on, saw 112 species; and Fedde sees 123. Jepson, who has studied them with care in the field, is not able to see a great number of species, although he finds numberless seasonal and other forms; and he does not see much hope in solving the *Eschscholtzia* puzzle by the usual study of herbarium material but rather by "combined field and cultural studies."

And here is the particular suggestion I desired to make in the writing of this paper,—that a few groups be worked out very carefully by growing the plants under observation and as far as possible under conditions of control and always, of course, in comparison with living feral material. Such studies might require some years, even in a relatively small group: very good—the results would be all the more convincing. If a half dozen groups could be worked over in this way, with discussion of the living material by standing committees of some recognized association, we should very likely arrive at a basis of judgment such as the present collecting and inci-

dental field notation and indoor study of dried material can never give us. The conclusions,—or the points of view, if conclusions were impossible,—would be invaluable in bringing us to an understanding and therefore to a substantial agreement on some of the matters that are now most perplexing us. This is now the greatest need in systematic botany.

This means that we should now study life histories with the purpose to apply the knowledge in systematic work. We shall come to the end in due time of the inventory process in describing new species. After a time we shall consider it to be scarcely worth the while to carry the separative process very much farther, and we shall then undertake a synthetic process of building up the forms into species-values. The current studies of variation and of plant-breeding are bringing us to a new point of view: it is now time that we begin the incorporation of these methods into our systematic work.

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